

US EPA ARCHIVE DOCUMENT

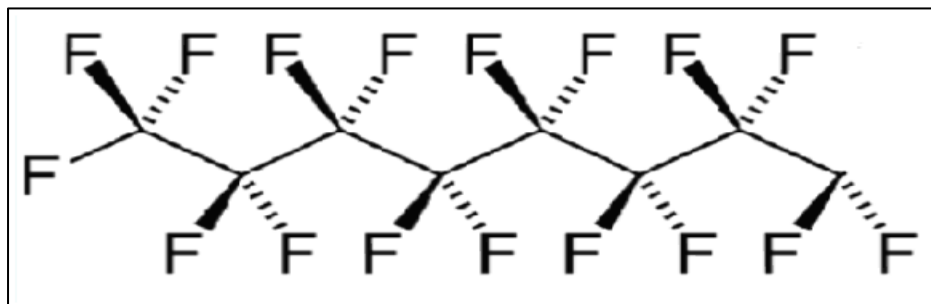


Perfluorinated Chemicals: Chromium Electroplating Study

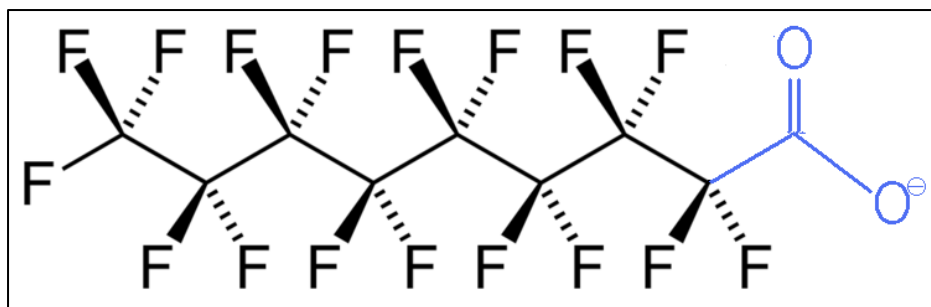
Kimberly Harris
PFC Regional Team Leader
U.S. EPA Region 5

USEPA-R5 GLBTS Meeting, Chicago, 12-02-09

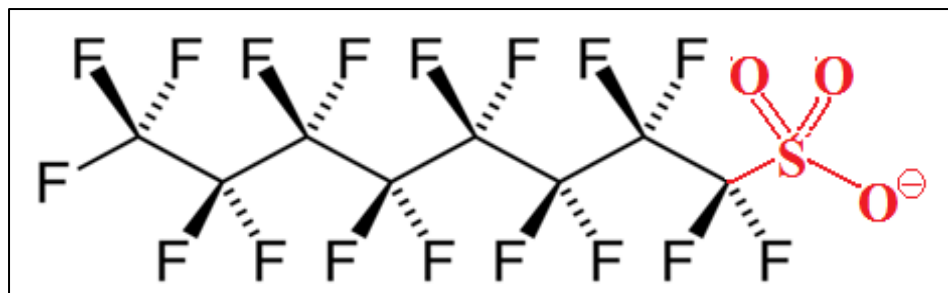
Perfluorinated Chemicals (PFCs)



Carbon-Flourine Chain



Carboxylate End (e.g., PFOA)



Sulfonate End (e.g., PFOS)

Commonly Referenced PFCs

Common Name	Acronym
Perfluorooctanoic acid, C-8	PFOA
Perfluorooctane sulfonate, C8	PFOS
Perfluorobutanoic acid, C4	PFBA
Perfluorobutanesulfonate, C4	PFBS
Perfluorohexanesulfonate, C6	PFHxS
Perfluorohexanoic Acid, C6	PFNA
Perfluorooctane sulfonamide, C8	PFOSA
Perfluorononanoic acid, C9	PFHxA
Perfluorododecanoate, C10	PFDoA
Perfluoroundecanoate, C10	PFUnA
Perfluorodecanoate, C10	PFDA
8:2 Telomer Alcohol	8:2 FTOH
10:2 Telomer Alcohol	10:2 FTOH

Commercial Sources

- Historical Commercial Uses
 - Stain resistant coatings for carpet, fabrics and leather
 - Paper coatings
 - Microwave popcorn bags
 - fire-fighting foams
 - Floor polish/wax
 - Denture cleaners
 - Shampoos
 - Metal Electroplating



Why Are Scientists Concerned?

- Some PFCs are stable and persistent in the environment (distributed globally from the Arctic to the South Pacific).
- Cause animal toxicity.
- Widespread in the environment and human population.
- Long half-life in humans.



National Activities

- Ongoing HQ risk assessment.
- ORD research.
- 2010/15 PFOA Stewardship program.
- Additional efforts through OPPTS.
- Drinking Water Health Advisories.



Significance of PFCs in R5

- 3M contamination in Minnesota.
- DuPont contamination in Ohio.
- Significant occurrence in the Great Lakes.
- PFCs made a regional priority in 2007.



R5 PFC Chromium Electroplater Study

- In 2007, MN found high levels of PFOS at the Brainerd WWTP.
- An electroplating facility was identified as the source.
- R5 study question: Are chromium electroplating facilities discharging PFOS to WWTPs?
- R5's study to be considered by the U.S. EPA's Office of Air Quality Planning and Standards.



Chromium Electroplating Facility



Figure 1: Four Chromium Electroplaters Sampled by Cleveland Team (Facilities #1-4)

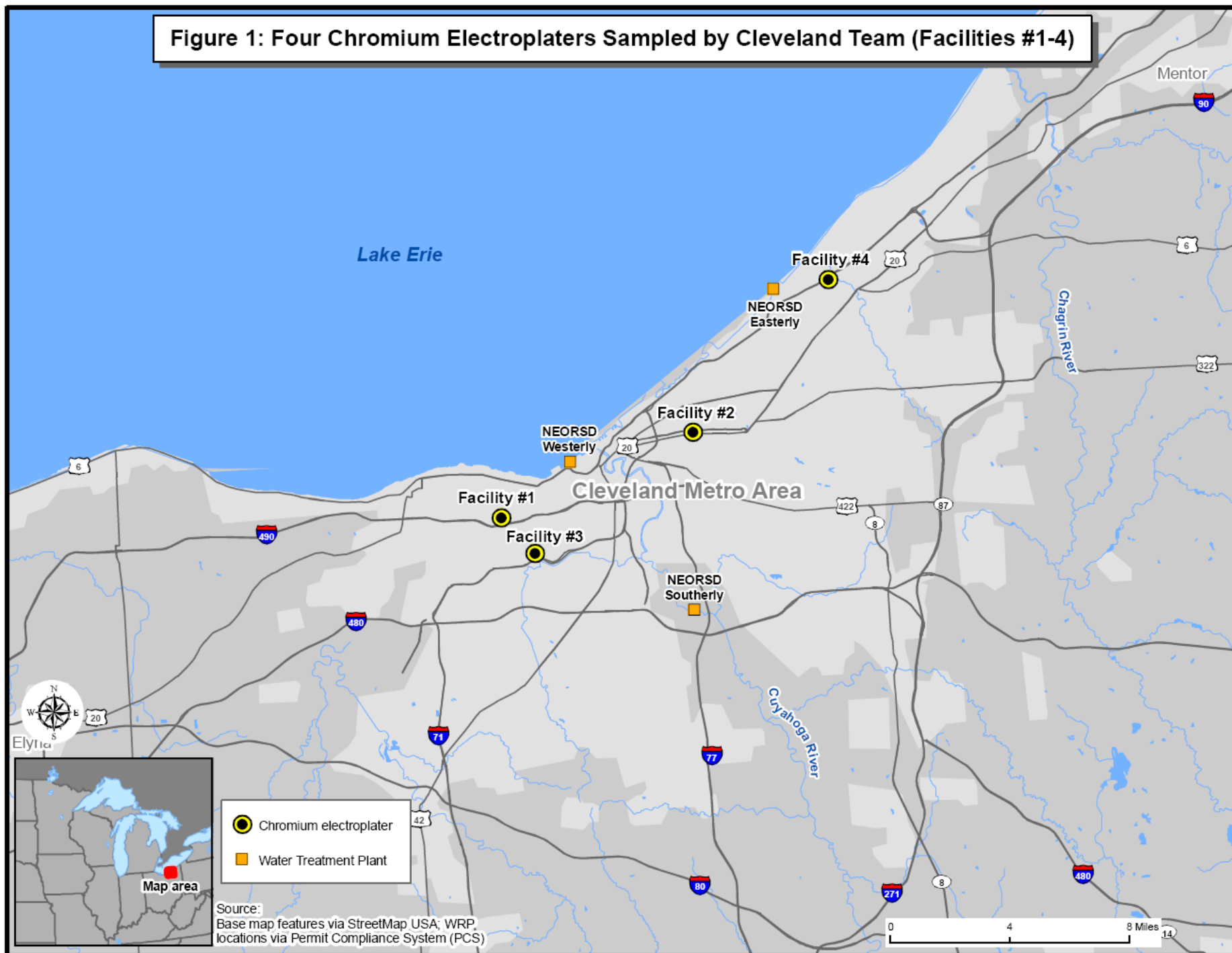
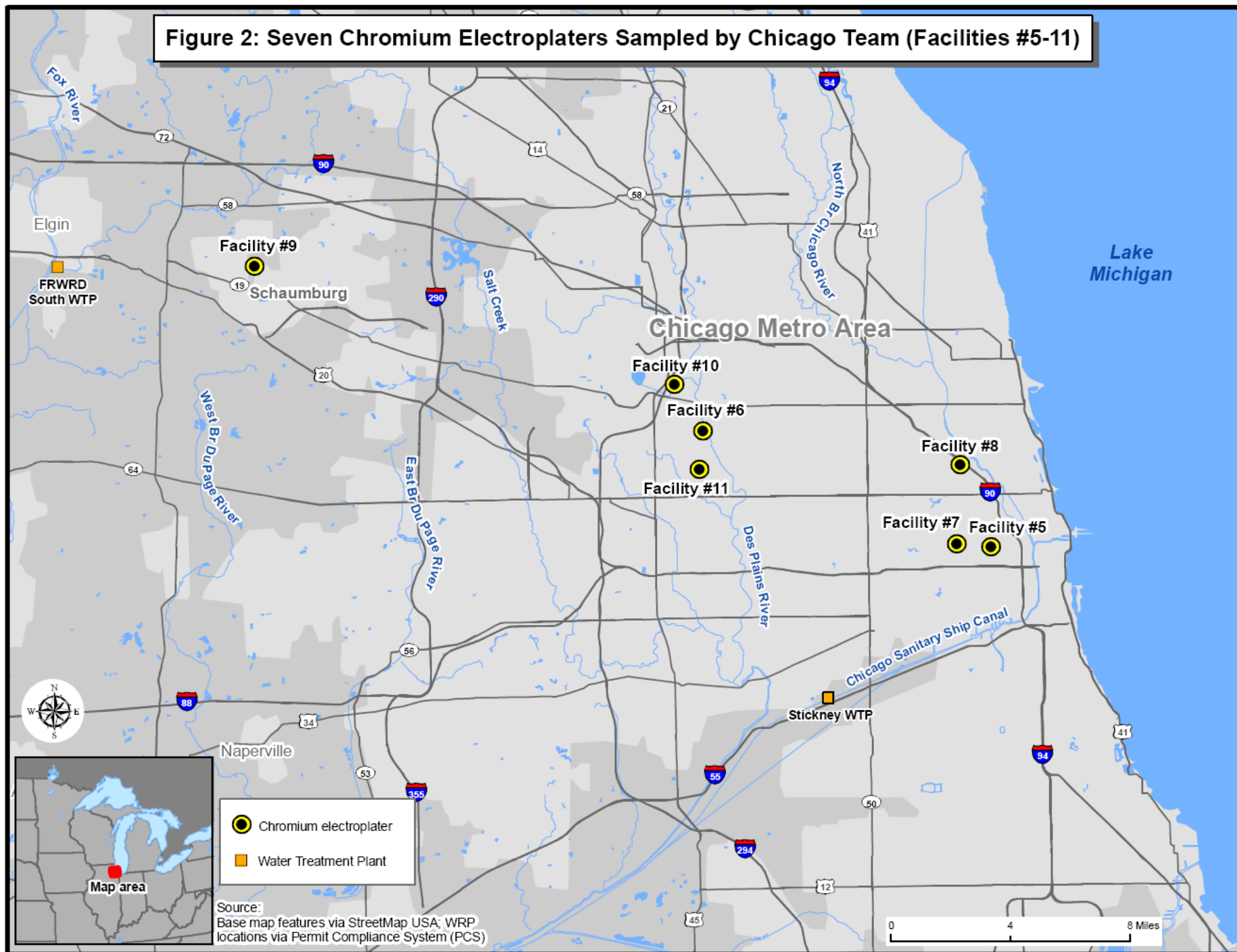


Figure 2: Seven Chromium Electroplaters Sampled by Chicago Team (Facilities #5-11)



R5 Electroplating Study Results

- 13 PFCs were tested.
- At least 8 different mist suppressants were used.
- PFCs were detected in all 11 facilities' waste discharge streams.



R5 Electroplating Study Results

- PFOS detected in 10 out of 11 facilities.
- PFOS concentrations ranged from 31.4 -39,000 ppt.
- None of the 10 had effluent higher than Keystone Automotive.

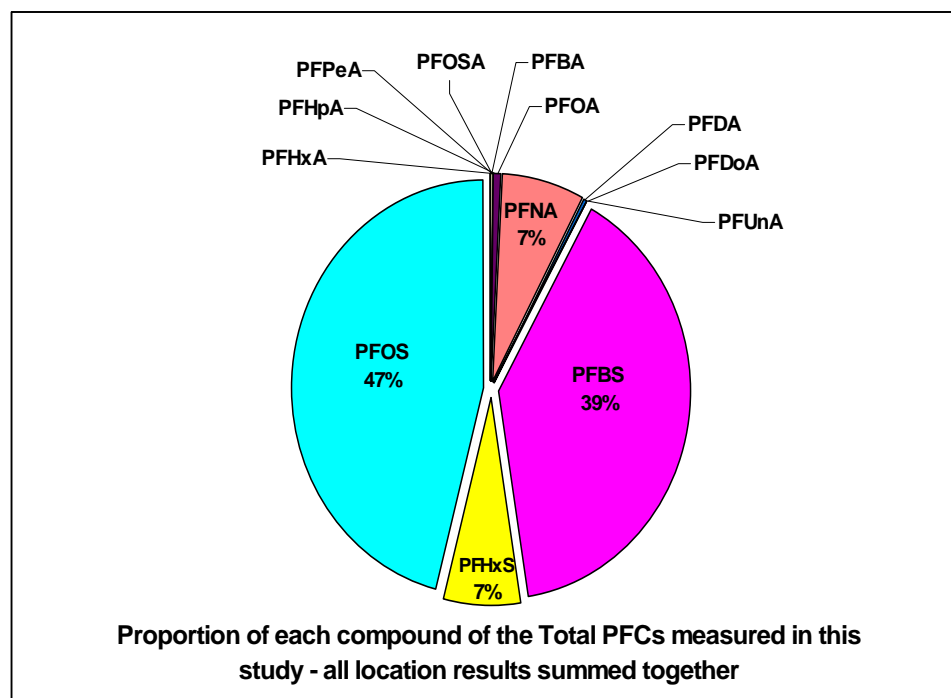


R5 Electroplating Study Results

•4 highest concentrated compounds:

- PFOS at 7.68 ppb
- PFBS at 6.58 ppb
- PFNA at 1.19 ppb
- PFHxS at 1.10 ppb

- These 4 chemicals made up over 99% of all compounds.



R5 Electroplating Study Results

- Nine of the ten facilities tested above the U.S. EPA provisional health advisory for PFOS in drinking water (set at 200 ppt).
- Ten facilities tested above the Minnesota water quality criteria for PFOS in the Mississippi River (set at 6 ppt).



Summary

- Study question: Are chromium electroplating facilities discharging PFOS to WWTPs?
- Yes, our work found this industry as a likely source.
- Improved O&M procedures can be implemented to reduce PFC releases.
- Study will be considered by OAQPS to evaluate the use of PFOS in suppressing Cr(VI) emissions under air standards.



Acknowledgements

USEPA-Region 5

Erin Newman

Bradley Grams

Ted Smith

Alexis Cain

Leslie Kirby-Miles

Margaret Gielniewski

Ash Sajjad

Seth Dibblee

Mark Conti

David Barna

Gerald Golubski

Ken Gunter

John Dorkin

Environment Canada

Peter J. Paine

USEPA-OPPTS

Toni Krasnic

Minnesota Department of Health

James Kelley